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The atmograph may be employed in the measurement of the transpiration of an excised branch by tying the branch into a rubber tube and connecting with the outlet at *d'*, or it may be used in other cases in which it is desired to measure the passage of water.

For observation in the field the instrument must be inclosed in a box in order to preserve it from interference. If it is desirable to operate several atmometers at a single station, as described by YAPP, the atmographs may be compactly arranged in a box with a common reservoir and a single chronograph (fig. 3), as many pens being used as atmographs. Experience has shown that the piping leading to the atmometers should be metallic. Glass and rubber are subject to many hazards, not only from vandals but also from the less conspicuous members of the fauna. Grasshoppers sometimes exhibit a very interesting, but none the less disastrous, adaptation of appetite to the supply of rubber tubing.

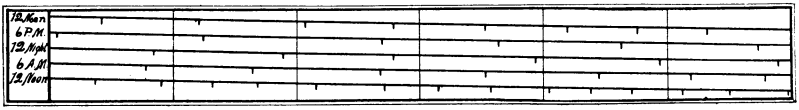

FIG. 4

For a series of simultaneous records a chronograph drum rotating in seven days will be found desirable. The records shown in fig. 4 were made in the laboratory upon a chronograph rotating once in six hours and with a group of four LIVINGSTON atmometers. The interval required for the evaporation of 10 cc. by the four cups has been noted to vary, within twelve hours, from a maximum of 113 minutes to a minimum of 17 minutes.—W. L. EIKENBERRY, *The University of Chicago.*

THE SPORANGIUM OF LYCOPODIUM PITHYOIDES

(WITH PLATE VII)

So much importance has been attached at various times to the position, shape, and development of the sporangium in *Lycopodium*, that any unusual forms are of interest. The rare species *L. pithyoides* Schlect and Cham., which is figured in a former paper,[1] presents certain variations. The stem tip is large and blunt, with a flattened apical region. The earliest stages in the development of the sporangium agree with those of previously described species (fig. 6). The leaves appear in close succession on the flattened tip, leaving no evident internodal region. The development of the internode afterward is very rapid, causing a conspicuous shifting of the position of the sporangium (fig. 7). The rapid growth of the internode, combined with the unequal rate of growth of the two sides of the sporangium, causes the foliar structure to become axial. A change of position to this extent is not uncommon in other species of *Lycopodium*, but in *L. pithyoides* there is a continued inequality in the rate of growth, so that the sporangium eventually takes a position on the stem entirely distinct from the leaf. At maturity the sporangium is not disturbed if the leaves are pulled off. The development in this case is the reverse of that in most species of *Selaginella*, in which the sporangium arises as a cauline structure, but becomes foliar when mature; while in *L. pithyoides* it is foliar in origin, but cauline at maturity.

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[1] STOKEY, A. G., The roots of *Lycopodium pithyoides*. BOT. GAZETTE 44:57–63. 1907.

The sporangia of *L. pithyoides* are very large, attaining a breadth of 2–2.5 mm., and resemble those of *L. dichotomum* Jacq., according to BOWER'S description and comparison,[2] although Miss SYKES'S drawing,[3] while suggesting a tendency in the sporangium to be cauline, does not indicate a very close resemblance in other points. The stalk is short and relatively slender, ranging from 12 to 18 cells in diameter in sections cut radially, and about twice that in the other diameter. The cells are elongated and thin-walled, with no corner thickening and no trace of lignification such as Miss SYKES has described in *L. clavatum* and other species. The vascular strand of the leaf shows no tendency to approach the sporangium. The leaf trace arises from the vascular cylinder 5–6 mm. below the sporangium, turning sharply upward and then making an outward bend as it approaches the leaf.

The sporangia resemble those of *L. dichotomum* in the number of wall layers also. In the upper part of the sporangium there are usually four layers, but there may be even more owing to the irregularity in the arrangement of the middle layers (fig. 4). At the base of the sporangium the wall may consist of 6–8 layers. In a young sporangium (fig. 8) the order of division and the relation of the layers is very plainly seen, but in the older sporangia this regularity of arrangement is lost. The inner layer or tapetum is well defined as a dense, darkly staining layer. The tapetal cells do not show any tendency to become rounded on the inner face. In some almost mature sporangia the tapetum is alive, while in others very little older the tapetum is entirely empty, but granules and droplets are abundant along its inner face. The emptying process is apparently a rapid one, as a considerable number of sporangia were found in both conditions but none in any intermediate stages. The cells of the tapetum retain their shape for a considerable time and do not become crushed and flattened until much later. The subarchesporial pod is well developed (fig. 2) and slightly irregular in outline, but does not form processes in the sporangium.

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[2] BOWER, F. O., Studies in the morphology of spore-producing members; Equisetineae and Lycopodineae. Phil. Trans. Roy. Soc. London B **185**:516. 1894.

[3] SYKES, M. G., Notes on the morphology of the sporangium-bearing organs of the Lycopodiaceae. New Phytologist **7**:41–60. 1908.

The leaves afford little protection to the sporangia except in the very early stages, owing to the fact that they are relatively narrow (figs. 3, 5) and soon become recurved. The line of dehiscence, which is marked by smaller cells than the rest of the wall, is median (figs. 1, 3).—ALMA G. STOKEY, *Mt. Holyoke College, South Hadley, Mass.*

EXPLANATION OF PLATE VII

FIG. 1.—Longitudinal section of sporangium. ×28.

FIG. 2.—Tangential section of a sporangium. ×26.

FIG. 3.—Transverse section through base of sporangium and sporangium stalk. ×28.

FIG. 4.—Section of part of the wall of sporangium. ×345.

FIG. 5.—Transverse section of sporangium. ×28.

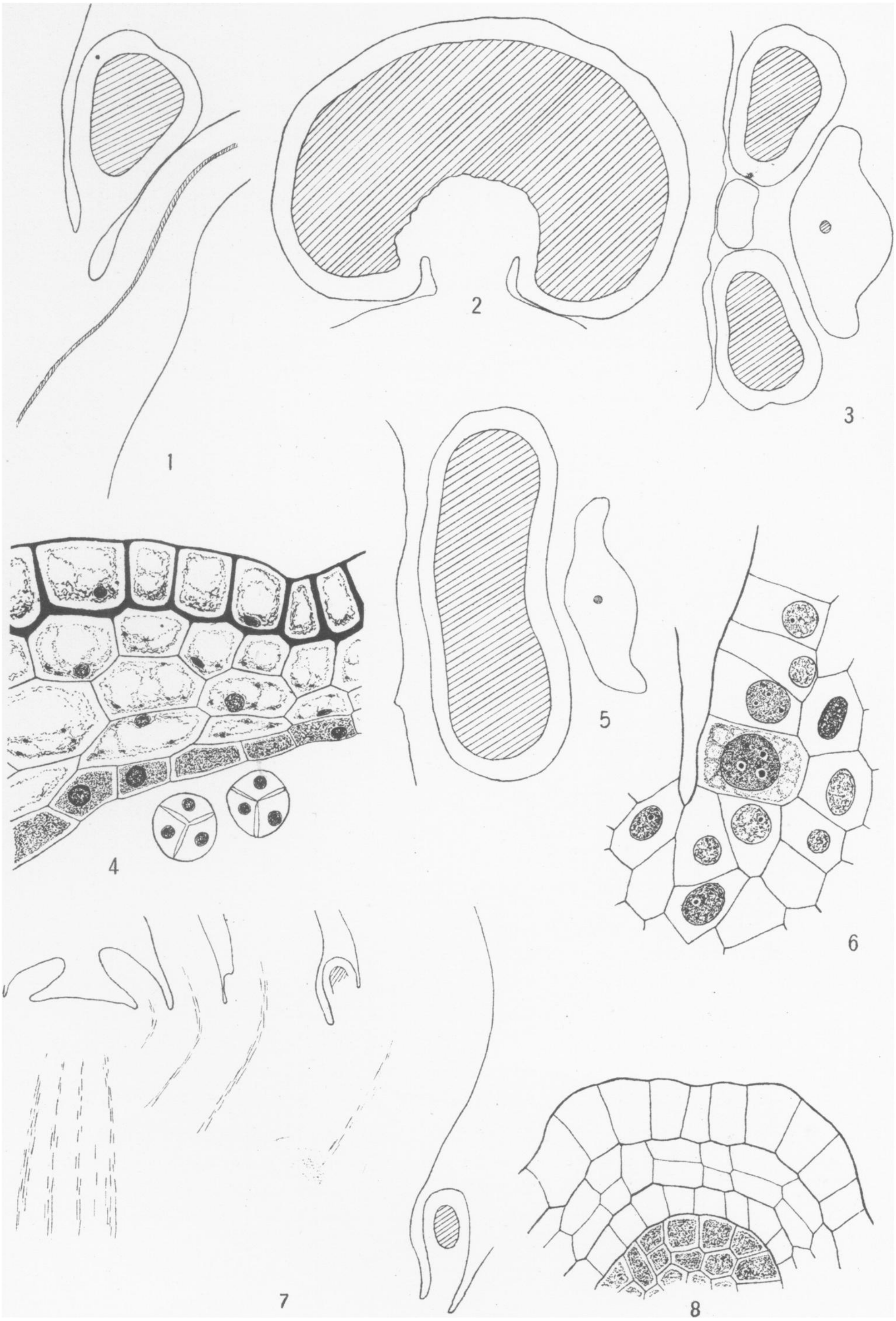
FIG. 6.—Longitudinal section through leaf, showing one of the initial cells of the sporangium. ×725.

FIG. 7.—Longitudinal section through stem tip, showing three stages in development of sporangia. ×36.

FIG. 8.—Longitudinal section of young sporangium, showing origin of wall layers ×345.

THE BOTANICAL CONGRESS AT BRUSSELS

The Third International Botanical Congress was held at Brussels, Belgium, May 14–22, 1910. Saturday, the 14th, was the day for registration. On Sunday, the 15th, the members of the congress assisted at a session of the Royal Botanical Society of Belgium held in the "dome" of the large building connected with the Jardin Botanique, at which several interesting papers were presented by the members of the society. Two of the general sessions of the congress were held in the same room, the opening session on Monday morning the 16th, and the closing one on Sunday the 22d. No regular sessions of the congress were held in the evenings, but during the week several interesting papers on phytogeographical subjects, economic botany, etc., were given in the evening.



STOKEY on LYCOPODIUM